

## **REMARKS**

This is responsive to the Office Action that was mailed December 18, 2002. The form of this Amendment is the Revised Amendment Format that was announced by the Deputy Commissioner for Patent Examination Policy, Steven Kunin, on January 31, 2003. The guidelines for this Revised Amendment Format were found on the "Pre-OG Notices" page of the United States Patent and Trademark Office website. The enclosed Amendment is believed to be in compliance with the Revised Amendment Format in light of those guidelines and the waiver of 37 C.F.R. §1.121 set forth therein.

### **Election/Restrictions**

An election requirement was imposed between Species I as shown in Figure 2 and Species II as shown in Figure 4. Applicant made a provisional election of Species I as reading on Claims 1-12 in a telephone conversation with the examiner on or about December 11, 2002. Applicant confirms the election of Species I and the examination of Claims 1-12 in this application.

It is stated in the Office Action that the "application contains claims directed to the following patentably distinct species of the claimed invention: Species I as shown in figure 2; and Species II as shown in figure 4." See page 2 of Paper 6. However, it should be noted that no reason(s) is provided for the examiner's conclusion that the claims are directed to two patentably distinct species. See M.P.E.P. 808 and 806.4(h) requiring a statement of the reasons why the species are patentably distinct. In the absence of such a statement, Applicant is not able to traverse this election requirement at this time.

### **Rejection of claims under 35 U.S.C. §103(a)**

Claims 1-3 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Hsu, et al. ("Hsu") and Frye, et al. ("Frye"). In particular, it is asserted that Hsu discloses a fuel process for converting a hydrocarbon fuel which has been passed through a desulfurization unit (purifier) and that Frye discloses a desulfurization unit that one skilled in the art would have selected for use as the desulfurization unit

suggested in Hsu. See pages 3 and 4, Paper 6. Applicant respectfully disagrees with the interpretation of the disclosures of the Hsu and Frye references. Moreover, Applicant respectfully disagrees that one skilled in the art would have been motivated to combine the teachings of the Hsu and Frye references in the manner suggested by the examiner.

Foremost, Hsu discloses a thermally enhanced compact reformer that is a plate-type reformer integrated with a fuel cell so as to utilize the waste heat generated by the fuel cell in the reforming process. In the background section of the Hsu reference, conventional or prior art methods for reforming fuels for use in fuel cells are disclosed. The section of text relied upon by the Office reads, "Conventionally, the fuel is pre-processed by passing the hydrocarbon fuel first through a desulfurization unit, then through a reformer...." Col. 1, lines 14-16. Notably, there is no teaching or suggestion in this statement that a desulfurization unit should be provided down stream from a reforming stack to purify a hydrogen rich gas as is recited in Applicant's Claim 1.

*not in Hsu*

It should further be noted that Hsu concerns a compact reformer that is integrated with a fuel cell so that heat generated by the electrochemical reaction in the fuel cell components is conducted and utilized in the reforming reaction(s). There is no teaching or suggestion in this disclosure that a purification stack should be interposed between the reformer and fuel cell components nor is there any teaching or suggestion that the reforming and purification stacks should be discrete stacks. In fact, the thermal integration of the fuel cell with the reformer teaches away from the use of a discrete intermediate purification stack. In sum, Hsu contains no teaching or suggestion that would have motivated one skilled in the art to have used any desulfurization unit down stream of a reforming stack to purify a hydrogen rich gas.

*not in Hsu*

With respect to Claim 2, it is asserted that Hsu discloses cylindrical vessels without interconnecting pipes, citing Figures 3 and 4. However, as described in the text of Hsu, the internal reforming electrochemical converter shown in Figures 3 and 4 consist of alternating layers of electrolyte and interconnector plates. In particular, the alternating layers of this plate-type

reformer are shown in clear detail in the exploded view of Figure 4. Hsu contains no teaching or suggestion that the reforming stack should comprise a plurality of stackable cylindrical vessels.

The Frye reference discloses a hydrodesulfurization reactor for use in removing sulfur from heavy fuel oils. See col. 1, lines 17-21. Foremost, it should be noted that the sulfur removal reaction disclosed in Frye consumes hydrogen. Therefore, one skilled in the art would not have utilized the technology taught in Frye in any fuel reforming process where the ultimate goal is to produce a purified hydrogen gas. Furthermore, there is no teaching or suggestion in Frye that the disclosed sulfur removing catalyst or reaction is appropriate for use in removing sulfur compounds from a hydrogen rich gas produced by a reforming stack. In sum, Frye contains no teaching or suggestion that would have motivated one skilled in the art to have used the disclosed desulfurization unit down stream of a reforming stack to purify a hydrogen rich gas.

With respect to Claim 2, Applicant respectfully disagrees that Frye discloses a plurality of cylindrical vessels. As illustrated in Figure 1 of Frye, reactor 24 includes catalyst beds 26, 28, 30, and 32. The focus of Frye is on controlling the temperature of the exothermic desulfurization reaction in these catalyst beds. To achieve this control, Frye discloses placing interbed transfer sections 34, 36, and 38 between the catalyst beds and injecting a quench fluid into these interbed sections. There is no teaching or suggestion that either the catalyst beds or the interbed sections within reactor 24 are discrete cylindrical vessels that are stackable without the need for connecting piping between each vessel, as is recited in Applicant's Claim 2.

Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Hsu and Frye, et al.

#### **Allowable Subject Matter**

Applicant extends his gratitude for the examiner's comments concerning Claims 4-12 and the allowable subject matter contained therein. No amendments have been made with respect to Claims 4-12, as they are


believed to also be allowable because of their direct or indirect dependency from Claim 1 as discussed above.

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All of the stated grounds of objection and rejection are believed to have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

  
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